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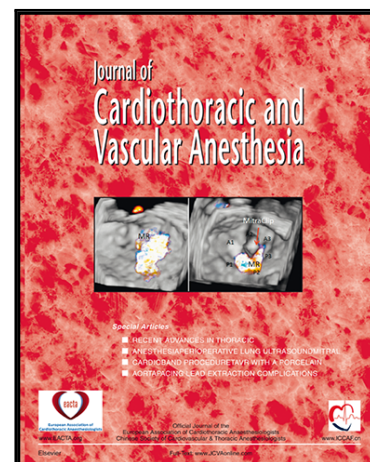
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## Accepted Manuscript

A perspective in Critical Care Medicine: To be a mature specialty we must move our focus beyond mortality

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Over the last 60 years we have built a dynamic service that has saved the lives of millions of patients around the world. In this time our community have defeated Polio epidemics, invented positive pressure ventilators and renal replacement therapy, we have learned to measure and image the function of the heart and have made the un-survivable; routine. Over the last 20 years we have become experts in conducting high quality randomized controlled trials and basic scientific research, we have demonstrated mortality benefits from improving the quality of our care and from working as multidisciplinary teams. We have created regionalized patient-centred pathways to ensure that patients receive the best possible care throughout their critical care admission and utilized innovative digital systems to facilitate patient management. We efficiently support failing organs 24 hours a day and seven days a week.

It is time to address the elephant in the intensive care unit (ICU); many of our survivors are severely disabled and never return to an acceptable quality of life. We discharge these patients to the care of other specialties and wash our hands of them when they leave our front door. We expect surgeons to follow up their patients after an operation; we should hold ourselves to the same standards.

The pioneering work of Herridge et al in acute respiratory distress syndrome (ARDS) patients demonstrated that survivors had persistent physical, cognitive and psychological issues that failed to improve over a five-year period.<sup>1</sup> Only 77% of survivors returned to work and this process took well over a year with a gradual transition and modified duties.<sup>1</sup> Patients suffered debilitating psychological morbidity as well as persistent cognitive impairment. This cluster of morbidity has been demonstrated repeatedly with almost a quarter of ICU survivors

suffering cognitive deficits equating to mild Alzheimer's at 12 months post discharge.<sup>2</sup> Psychological morbidity is even more common with up to a half of all patients affected by anxiety, depression or post-traumatic stress disorder.<sup>3</sup>

The term post intensive care syndrome (PICS) was developed by a group of expert stakeholders on behalf of the Society of Critical Care Medicine to describe '*new or worsening impairments in physical, cognitive, or mental health status arising after critical illness and persisting beyond acute care hospitalization*'.<sup>4</sup> With this new definition attendees aimed to facilitate awareness, prompt screening and stimulate research into this entity.<sup>4</sup>

There have been some successes: critical care follow up clinics are recommended by National Institute for Health and Care Excellence (NICE) in the United Kingdom with at least 30% of British ICUs engaged in this practice.<sup>5</sup> An international community of PICS experts is seen lecturing on the conference circuit and PICS is the subject of more published research with each passing year. Disappointingly, despite this global specialty expansion and organisational success no benefit has been shown in randomized controlled trials.<sup>6</sup> Furthermore there is no standardized approach to critical care follow up and a gross paucity of data to guide clinical practice. The ICU clinic room feels like the domain of the enthusiast, believing they are improving unmeasurable yet meaningful patient outcomes.

The ICU liberation collaborative's ABCDEF bundle has helped force a paradigm shift in clinical intensive care medicine.<sup>7</sup> Clinicians aspire to facilitate conscious patients participating in their own recovery. If sedation, delirium, and ICU acquired weakness are risk factors for PICS then minimizing these phenomena must be protective. Even with this sound bundle of guidance there are many factors we cannot control. It is possible the improvement in quality of critical care delivery is responsible for PICS. Perhaps we are saving lives at the

cost of creating disabled survivors. Conversely maybe better intensive care practice is shifting the whole outcome curve beneficially with lower mortality and more highly functioning survivors.

In this issue of the *Journal of Cardiothoracic and Vascular Anesthesia*, McDonald et al,<sup>8</sup> present a study looking at long term outcomes in 42 patients who received veno-venous extracorporeal membrane oxygenation (VV-ECMO) for acute respiratory failure.<sup>8</sup> This work is to be lauded and is the first of its type to categorize adult respiratory ECMO survivors through the modern frame of PICS. ECMO is not only effective as rescue therapy for critical hypoxemia but also facilitates protective lung ventilation. It is therefore interesting to compare this cohort with the study of ARDS survivors by Herridge et al,<sup>1</sup> in an attempt to answer our previous question – have more advanced organ support techniques improved function as well as survival?

Before attempting to answer this question we should look at some details of the trial. Over a 27 month period the authors used VV-ECMO in 97 patients; 65 (67%) of them were alive at the time of the trial. The assessment comprised of a structured interview including well validated scores of physical function and psychological well-being. Unfortunately, the authors did not report any measure of illness severity nor did they assess cognitive outcomes. There was no data provided on hypoxemia, a proven risk factor for cognitive deficits.<sup>9</sup> The results show an all too familiar 62% of patients with good physical function, 48% with clinically significant anxiety and 26% suffering from depression. In answer to our question it would appear in this cohort VV-ECMO has improved survival but not decreased PICS.

The authors used post traumatic growth index as a measure of their patients' psychological resilience and recovery, an interesting concept which concentrates on positive responses to traumatic events. It is inspired by this index that we draw our conclusions: we have described

a growing health epidemic of our own causing with no evidence-based treatment that is debilitating to patients and costly to healthcare systems. It is now essential to collect longitudinal data about functional outcomes and appraise our practice in the light of this knowledge.

We must consider how our management on the intensive care unit may impact upon our patients for the rest of their lives. We must research mechanisms of muscle weakness and delirium as well as institute evidence-based practice to minimize their occurrence. We owe it to our patients to turn our attention to their future happiness. We must face this problem and grow. Surviving is not enough.

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